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The function of swarming in *Blacus* species (Hymenoptera, Braconidae, Helconinae)

by

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ABSTRACT. — The biological function and significance of swarming by the males in some *Blacus* species is discussed. The apparent scarcity of females in the neighbourhood of male swarms is explained by the assumption that mating occurs in late evening or at night.

Swarming is a widely distributed phenomenon, which can be defined as a process of specific assembly wherein sexually matured individuals engage in eurythmic mass hovering and dancing (McAlpine & Munroe, 1968: 1160). Probably the swarm itself is essentially a flight-station, an assembly point controlled by a landmark or „swarm marker” (Downs, 1969: 272). Swarming is well known of the males in at least 26 families of the Diptera, belonging to the suborder Nematocera. Less frequently it is observed in the Ephemeroptera, Neuroptera, Trichoptera, Lepidoptera, Hemiptera, and Hymenoptera. The swarming of parasitic Hymenoptera is exceptional and only observed in the Blacini (Braconidae, Helconinae) and in the Metopiinae (Ichneumonidae).

Swarming by the males of *Blacus* (*Ganychorus*) *ruficornis* (Nees) is considered by Syrjämäki (1976: 68) to be without biological significance and he proposed the hypothesis that their swarming possibly represents a “vacuum or displacement activity in their sexual behaviour”. This hypothesis is based on his observation that all 8077 specimens collected from swarms were males, while ten samples from the nearby vegetation yielded another 102 males and no females. But this observation does not prove there are no females present within a few hours or days after sampling; or that there are no females ready to emerge from their hosts in the litter. Indeed sweeping of swarms often yields males only, but exceptions are less scarce than is supposed by Syrjämäki. For example, a small sample of a swarm of *ruficornis* in late sunlight above a red clover field in Trout Lake (U.S.A., Wisconsin, 20.X.1918; Van Achterberg, 1976: 204) yielded nine males and two females.

König (1967: 113) has given some interesting observations on the swarming of *Blacus*. He quoted an observation by Gersdorf in 1963 that some males separated from a swarm of a *Blacus* species to copulate with one of the females walking on the surrounding vegetation. According to König the swarms are also persistent; even a thundershower could not desintegrate the swarm. As is shown by König in his fig. 1, the emergence of the males of *ruficornis* is somewhat earlier in time than that of the females, as is normal in the parasitic Hymenoptera and, e.g., in the Tipulidae (Binns, 1976: 93). This may explain the difficulty in obtaining the females at the beginning of the swarming season. Additional clues may be given by the pre-mating behaviour of swarming Diptera and of related Braconidae.

McAlpine & Munroe (1968: 1154) reported that in Texas swarms of *Dasiops alveofrons* McAlpine (Lonchaeidae, Diptera) consist almost exclusively of males. The females were rarely seen or collected during the day, but were commonly beaten from bushes at night! As noted by Van Achterberg (1976: 204), *Blacus* (*Ganychorus*) *ruficornis* (Nees) is frequently captured at light. The sexes are both well represented, so this is an indication of nightly activity in males and females of this swarming species of *Blacus*. McAlpine & Munroe cited a second example in the family Lonchaeidae, recording males of *Lonchaea laxa* Collin swarming in sunny openings

between spruce trees. At the same time females of the same species were resting and crawling about on the tips of the spruce branches adjacent to the swarms, and one copulating pair was collected. Swarms of Lonchaeidae were most frequently observed on calm, clear days, while little or no swarming took place during cloudy intervals (l.c., p. 1158). The swarming of Lonchaeidae is positively influenced by sunlight and the ceasing of swarming in late afternoon seems to be related to this phenomenon. In *Blacus* this relationship is reversed, swarming being observed in, at the most, weak late sunlight.

Among the relatives of *Blacus*, species are known of which the males aggregate near the place where the females will emerge sooner or later (Haeselbarth, 1962: 236). From this behaviour the swarming of *Blacus* can be derived, as shown by Van Achterberg (1976: 173), if it is combined with a high density of the species involved. Very curiously is the behaviour of males of *Pimpla instigator* (Fabricius) (Ichneumonidae, Pimplinae), reported by Varley (1950: 288), aggregating near emerging males of the same species. The supposition that swarming in *Blacus* lacks biological significance is unlikely because (besides the evidence from observations) it is a complex kind of aggregation. The orientation of the males may be primarily by visual clues from the surroundings, while secondary pheromones may be used as is indicated by the enlarged parastigma with sensory organs (Hoffmeyer, 1932: 69) and the time of swarming. The swarming of the males in the evening (and night?) instead of daytime may be an adaptation to the possible nightly mating habits of *Blacus* species, perhaps both to avoid predation. The females may appear sometime later, probably at night or in late evening, by which time observers will have departed so that the females escape attention. An exception to this may arise when swarming takes place in late September and October (as in the case reported from Wisconsin) when the nights are cooler so that mating may occur earlier, resulting in females being more easily collected.

The question of the biological significance of swarming in *Blacus* is not settled, but it is likely that mating occurs in late evening and at night. The question may be resolved by continuous observation and sampling of the swarm and of the litter in the evening and following night.

ACKNOWLEDGEMENTS

I wish to express my sincere thanks to Dr. M. Shaw (Manchester) for his valuable remarks.

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